



Design it



Structural Solutions Ltd

37 Hall Bank, Barnsley, S75 1EX

m: 07794510438

e: designit.struct@gmail.com

Job Ref.

19115

Rev.

0

Date.

Jan 20

Calculations for:

**The Old Courthouse,
12 Regent St, Barnsley**

**Support Design for
Proposed Lift Installation**

Prepared By:

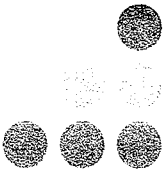
Ian R Thorpe

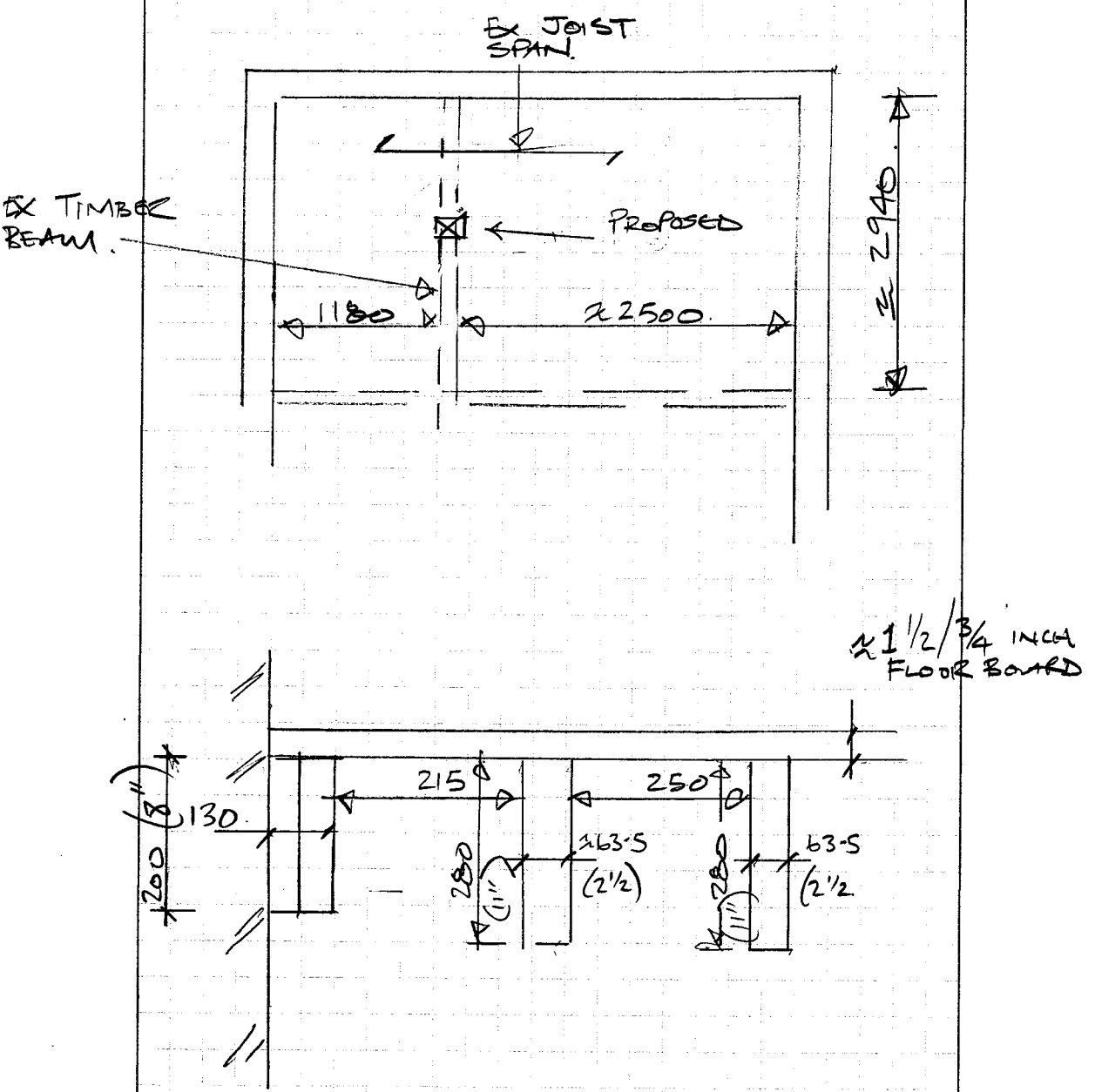
BEng (Hons) CEng MStructE

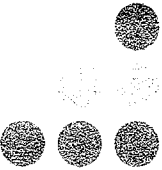
January 2020

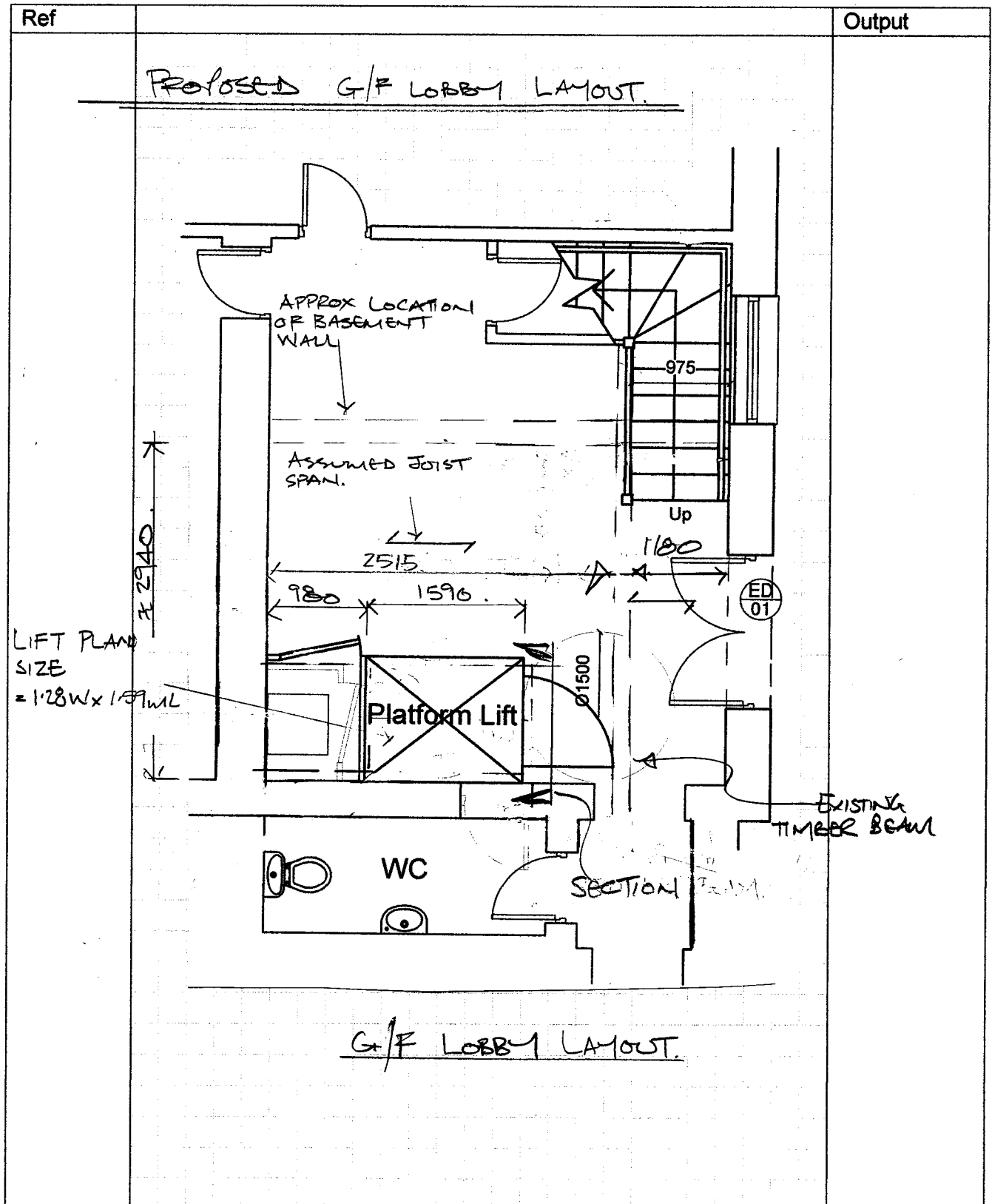
	Project	The Old Courthouse, 12 Regent St, Barnsley			Job Ref
	Section	Note A			19115
	Calc By	Date	Checked	Date	Sht No.
	I.T.	Jan 20	I.T.	Jan 20	

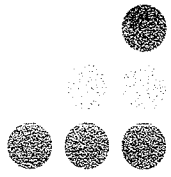
Ref		Output
	<u>Introduction</u> It is proposed to install an internal personnel platform lift as part of conversion works. The lift is to be installed within the existing entrance lobby off Eastgate. It will be required to provide support over the existing basement for applied lift loadings <u>Design Statement</u> A hole has been drilled within the ground floor lobby through the floor construction in to the basement. This appears to be timber flooring with overall thickness of 45mm. Supported on timber joists. (size and spacing to be confirmed). From inspection in the basement floor joists appear to span across the basement (TBC) with intermediate support. This support appears to be a beam section which is boxed out. Contractor is to expose the section to determine the size. The lift is to sit at ground floor level. A level surface is required. From supplied details the lift imposes a dynamic force of 34.06kN over a base size of 1.28m W x 1.59m L. It is proposed to provide trimmer / support beams to carry the lift load directly. <u>Details</u> Reference should be made to the following, Proposed layout details ref NPS-XX-P-XX-A-DR-041 rev P2. Lift supplier details ref AC0961 (Appendix A)	

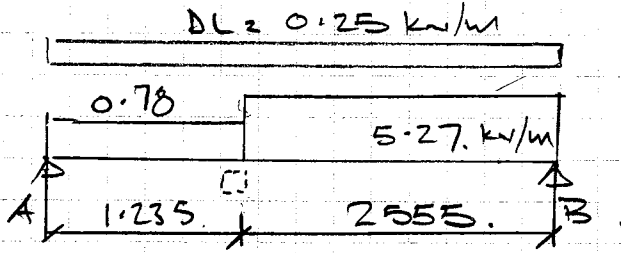
 Design-it	Project	12 REGENT ST, BARNSELEY.			Job Ref
	Section	LIFT INSTALLATION.			19115.
	Calc By	Date	Checked	Date	Sht No.
	IT	JAN 20	IT	JAN 20	

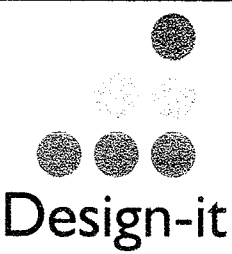
Ref		Output
	<u>Ex. FLOOR JOIST CHECK</u> 	

 Design-it	Project	THE OLD COURTHOUSE, 12 REGENT ST			Job Ref
	Section	LIPT INSTALLATION.			19115.
	Calc By	Date	Checked	Date	Sht No.
	IT	JAN 20	IT	JAN 20.	2



 Design-it	Project	12 REGENT ST, BARNSLEY.			Job Ref
	Section				19115.
	Calc By	Date	Checked	Date	Sht No.
	IT	JAN 20	IT	JAN 20.	3

Ref		Output
	<u>CAPACITY CHECK ON EX. JOIST.</u> ADOPT. 'IL = 2.5 kN/m². (OFFICE) DL = FLOORING = 0.36 kN/m² JOISTS = 0.16. SUS CEILING = (0.19 + 0.09) = 0.8 kN/m². FOR PROPOSED LIFT. WIDTH = 1280 mm. 2. NO. JOISTS = $\frac{1280}{310} = 4/5$. 2. LIFT UDL OVER BASE AREA = 17 kN/m² (SLS). — 17 x 0.31 = 5.27 kN/m (SLS). — REPLACE OFFICE UDL WITH LIFT UNF. LOAD. OVER 2.5m  BY $R_A \times 3.79 = 0.78 \times 1.235 \times 3.173 + 5.27 \times 2.555^2 + 0.25 \times 3.79^2$ — $R_A = 5.818 \text{ kN}$, $R_B = 9.56 \text{ kN}$.	

	Project	12 REGENT. ST, BARNESLEY.			Job Ref
	Section	LIFT INSTALLATION.			19115.
	Calc By	Date	Checked	Date	Sht No.
	IT.	JAN 20	IT.	JAN 20.	4

Ref		Output
	$M_{max} @ 2.062m \text{ FROM A. (1.738 FROM B)}$ $\frac{9.56 \times 1.738 - 5.5 \times 1.738^2}{2} = 8.31 kNm$ * MOMENT APPEARS EXCESSIVE FOR JOIST OVER CLEAR SPAN OF ROOM THEREFORE:- INTERMEDIATE SUPPORT IS REQUIRED, ADOPT SPAN = 2555mm < OK 1 SHT (5) NOTE EXISTING TIMBER BEAM SITS OVER DOOR OPENING INTO VOID. LINTEL IS OF STONE CONSTRUCTION AND THEREFORE WE CANNOT PROVE SUITABILITY FOR ADDITIONAL LOAD. OPTION :- BRICK UP UNDER EXISTING LINTEL EITHER FULLY OR DIRECTLY UNDER EX. TIMBER BEAM. TIMBER BEAM SECTION - TAKE TO BE. 200×100 - SPAN = APPROX 2940mm. * EXISTING BEAM OVER SPAN IS <u>NOT</u> SATISFACTORY. THEREFORE PROVIDE INTERMEDIATE SUPPORT. ADOPT SUPPORT @ APPROX 1150/1250 IE WIDTH OF PROPOSED LIFT PLATFORM.	



Project: 12 Regent St, Barnsley				Job Ref 19115	
Section: Proposed Lift Installation				Sht Ref 5	
Calc by IT	Date Jan-20	Checked IT	Date Jan-20	App	Date

Timber Design

Design Check on Existing Floor Joists

Loadings (serviceability)

Dead 0.8 kN/m²
Imposed 17 kN/m²

Joist size

Width, b mm 63 Joist c/c 300 mm
Depth, d mm 280 Joist span 2.555 m

Section Modulus, Z = 823.2 cm³

Applied Moment = 4.36 kNm

Applied bending stress = 5.29 N/mm² (M/Z)

← SPAN FROM
BEAM TO WALL

Permissible Bending Stress BS 5268 Tables 8 - 15

Timber grade **C16**
Bending stress = 5.6 N/mm²

Modification factors

K3 = 1.00 Load duration cl 2.8 (1-long, 1.25-med, 1.5-short)
K7 = 1.0076 Depth mod factor 2.10.6
K8 = 1.10 Load Sharing cl 2.9 (4 or more @ 610 max c/c)

Modified Permissible Bending Stress = 6.21 N/mm²
Bending Stress OK

Deflection

E = 8500
I = 115248000 mm⁴
UDL 5.1 kN/m

Imposed Load Deflection = 2.89 mm

Allowable = 7.665 mm **Deflection OK**

Design Check On Existing Joist Section

11" x 2.5" Section Satisfactory (As surveyed)



Project: 12 Regent St, Barnsley				Job Ref 19115	
Section: Proposed Lift Installation				Sht Ref 6	
Calc by	Date	Checked	Date	App	Date
IT	Jan-20	IT	Jan-20		

Timber Design

Existing Flooring Design Check

Loadings (serviceability)

Dead 0.8 kN/m²
Imposed 17 kN/m²

Joist size

Width, b mm 1000 Floor Span 1000 mm
Depth, d mm 38 Trimmer Span 0.3 m

Section Modulus , Z = 240.666667 cm³

Applied Moment = 0.20 kNm

Applied bending stress = 0.83 N/mm² (M/Z)

Permissible Bending Stress BS 5268 Tables 8 - 15

Timber grade **C16**
Bending stress = 5.6 N/mm²

Modification factors

K3 = 1.00 Load duration cl 2.8 (1-long, 1.25-med, 1.5-short)
K7 = 1.1700 Depth mod factor 2.10.6
K8 = 1.10 Load Sharing cl 2.9 (4 or more @ 610 max c/c)

Modified Permissible Bending Stress = 7.21 N/mm²
Bending Stress OK

Deflection

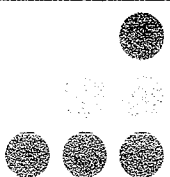
E = 8500
I = 4572666.667 mm⁴
UDL 17 kN/m

Imposed Load Deflection = 0.05 mm

Allowable = 0.9 mm **Deflection OK**

2 1/2" Thick Timber Floor Boading Satisfactory

For Proposed Applied Lift Loading

 Design-it	Project	12 REGENT ST, BARNLEY.			Job Ref
	Section	LIFT INSTALLATION.			19115.
	Calc By	Date	Checked	Date	Sht No.
	IT	JAN 20	IT	JAN 20.	7

Ref	Output
	<u>SUPPORT BEAM CHECK</u> REFER TO SHT 0 FOR MIN BEAM SECTION REQUIREMENTS FLOOR SPAN = 1890mm. AV FLOOR LOAD = $\frac{(17+2.5)}{2} = 10 \text{ kN/m}^2$ ∴ MIN SECTION <u>200DP x 100 WIDB.</u> <u>GRADE C16.</u> SUPPORT/POST REQUIRED AT MAX 1200mm. ALTERNATIVELY PROVIDE SUPPORTS AT 600mm. c/c. OR INCREASE WIDTH OF BEAM OVER 1200mm FOR INCREASED CAPACITY. <u>POST DESIGN.</u> AXIAL LOAD = 18kN (SLS) ∴ ADOPT. MIN <u>100 x 100 GR C24.</u> <u>TIMBER POST.</u> <u>FIXINGS.</u> HEAD - PROVIDE ANGLE BRACKETS INTO EXISTING BEAM.



Project: 12 Regent St, Barnsley				Job Ref 19115	
Section: Proposed Lift Installation				Sht Ref 	
Calc by	Date	Checked	Date	App	Date
IT	Jan-20	IT	Jan-20		

Timber Design

Design Check on Support Beam

Loadings (serviceability)

Dead 0.8 kN/m²
Imposed 10 kN/m²

Joist size

Width, b mm 100 Floor Span 1890 mm
Depth, d mm 200 Trimmer Span 1.15 m

Section Modulus , Z = 666.666667 cm³

Applied Moment = 3.37 kNm

Applied bending stress = 5.06 N/mm² (M/Z)

Permissible Bending Stress BS 5268 Tables 8 - 15

Timber grade **C16**
Bending stress = 5.6 N/mm²

Modification factors

K3 = 1.00 Load duration cl 2.8 (1-long, 1.25-med, 1.5-short)
K7 = 1.0456 Depth mod factor 2.10.6
K8 = 1.00 Load Sharing cl 2.9 (4 or more @ 610 max c/c)

Modified Permissible Bending Stress = 5.86 N/mm²
Bending Stress OK

Deflection

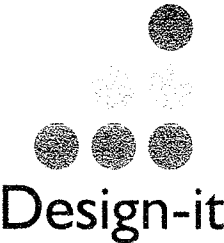
E = 8500
I = 66666666.67 mm⁴
UDL 18.9 kN/m

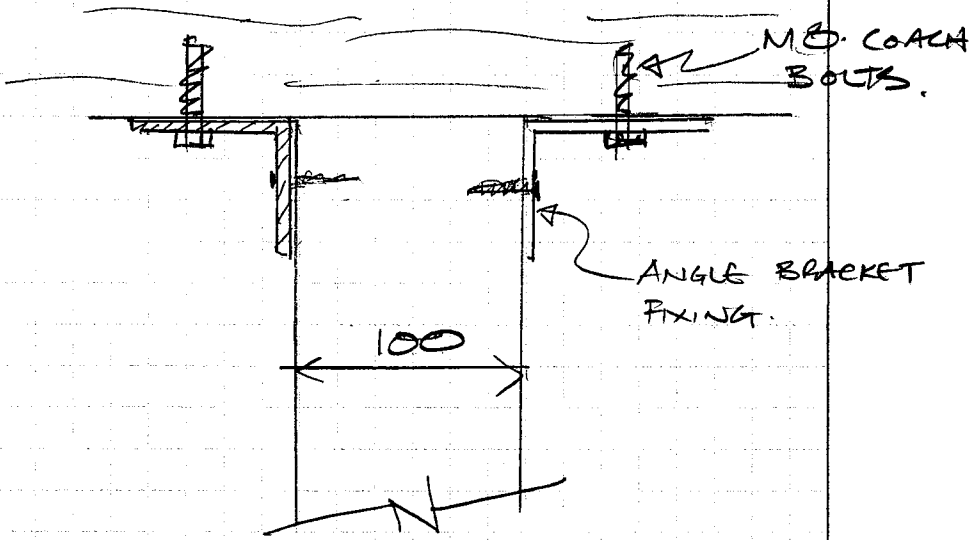
Imposed Load Deflection = 0.76 mm

Allowable = 3.45 mm **Deflection OK**

Provide Min Section - Rafters R1

150 x 50 Grade C16 Rafters @ Max 450 c/c

	Project	12 REGENT ST, BARNLEY.			Job Ref
	Section	LIFT INSTALLATION.			19115.
	Calc By	Date	Checked	Date	Sht No.
	IT	JAN 20	IT	JAN 20.	9

Ref		Output
	 <u>BASE FIXING:</u> PROVIDE SQ PLATE SHOE BOLTED TO EXISTING CONCRETE FLOOR SLAB.	

Appendix A

Platform Lift Details and Load Spec

Optimum 100 Platform Lift

General Builders Work requirements

Drawing Key: W (width) = Sides A & C - L (length) = Sides L & R

Lift entry:

- * **Pit:** Form a perpendicular (to shaft), level and smooth surface to a depth of 60mm with a tolerance of +5mm/-0mm. Pit dimensions to be 1280mm W x 1590mm L & capable of withstanding a total vertical dynamic load of 34.06kN

Aperture through the building:

* LIFT TO HAVE A RAMP FROM EX. FFL (NO PIT).

Provide a vertical aperture through building of 1280mm W x 1590mm L

Opening at each landing:

Clear openings aligned with the lift shaft, to enable each door-frame to be fitted to the lift from the landing: -

- Landing G, side R; door on long side = 1590mm W x 2230mm H
- Landing 1, side A; door on short side = 1280mm W x 2230mm H

Electrical requirements:

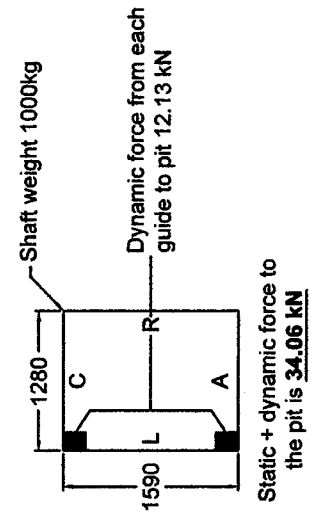
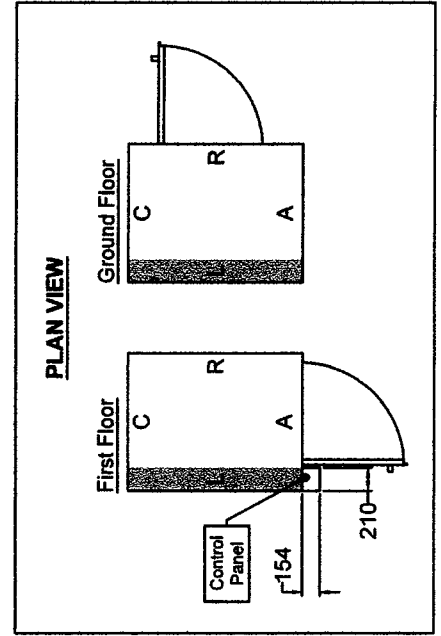
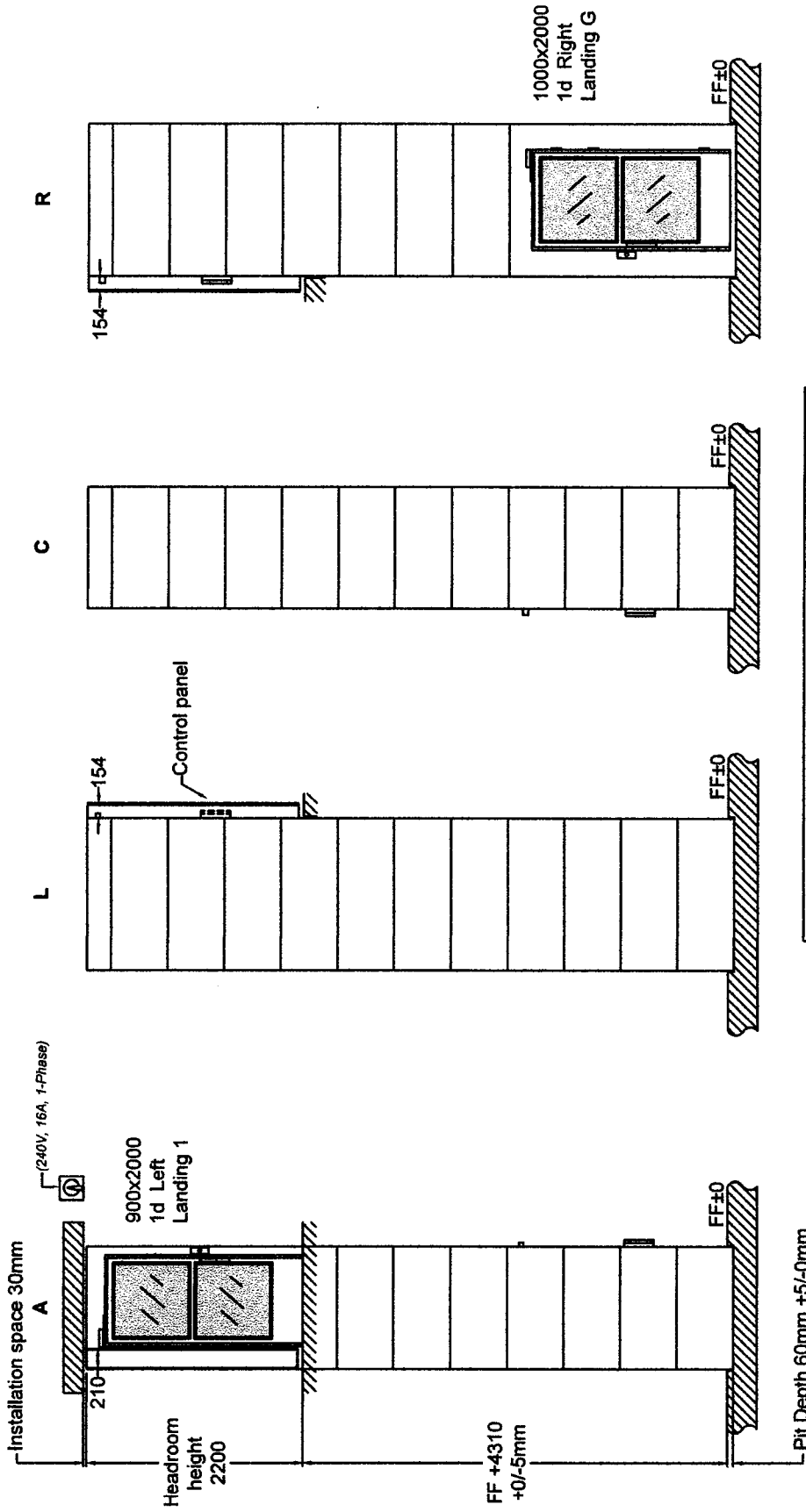
- Power supply; dedicated, RCD, single-phase, 240v, 16amp, 50 Hz, grid earth
- Provide a lockable isolator, at 2.3m approx above floor level, positioned adjacent to the control cabinet located at the top floor level; landing 1, side A & on the left hand side (as viewed from the landing)
- Intercom; provide 4 core x 0.75mm screened communication cable from the lift control cabinet to the remote station. **IMPORTANT:** if the communication cable is not fitted at the time of installation then the lift cannot be left in service and will require a further chargeable site visit to commission the lift

Fire Rating the Lift Shaft (if applicable)

- Provide a block built or plaster stud wall for the full-length of the lift shaft with a minimum plumb internal dimensions of 1300mm W x 1600mm L, which must be returned back to each doorframe after completing installation, with the appropriate fire resistant protection to fully enclose the lift

Miscellaneous:

- Following installation make good around lift enclosure
- Provide disposal facilities for delivery packaging materials



Platform dimension 1120 x 1480

Drawing No. AC0961

BIADS, 12a Regent Street, Barnsley, S70 2EW

Revision:	Initial Issue	Model:	Optimum 100
Date:	03/10/2019	Status:	Approval Required

Ability Lifts Limited
Khepera Business Centre
9 Oregrove Road, Sheffield
North Yorkshire, S13 9LQ

